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FIREARM IDENTIFICATION SYSTEM AND METHOD FOR FORENSIC PURPOSES

The present invention relates to a system and method for identifying a firearm, and more particularly, a system and method for placing markings on the inside of a firearm's firing chamber that will cause those markings to be imprinted on a bullet casing used with the firearm. The markings are specific to each firearm, allowing identification of the firearm that fired the bullet from the markings left on the bullet casing.

Currently, firearms are identified by a unique serial number that is inscribed into the frame of a firearm. This current identification method of inscribing a serial number into the frame does not have a means of transferring the serial number information to the bullet or its casing. Any identification of a firearm to a bullet that was fired from the firearm relies, if at all possible, on random markings left on the casings and bullet fragments by imperfections left on the interior surfaces of the firearm made during the manufacturing process. However, this method is imprecise and successful only if the gun is located shortly after the bullet casing in question is found and the gun is tested. The imperfections on the inside of the firearms may change after time, preventing identification if too much time or too many shots are fired from the firearm in question. Additionally, the firearm manufacturers do not record the markings made on bullet casings or bullets before the firearms are sold, so

the firearms must first be located and then tested in order to match a particular bullet casing or bullet with a firearm.

Accordingly, the present invention is directed to a system and method for marking a firearm that substantially obviates one or more of the problems and disadvantages in the prior art. Additional features and advantages of the invention will be set forth in the description that follows, and in part will be apparent from the description, or may be learned by practice of the invention. The objectives and other advantages of the invention will be realized and attained by the apparatus and process particularly pointed out in the written description and claims, as well as the appended drawings.

SUMMARY OF THE INVENTION

To achieve these and other advantages and in accordance with the purpose of the invention as embodied and broadly described herein, the invention is directed to a firearm including a frame, a trigger, a firearm firing chamber, a barrel, and a firearm indicia formed on a predetermined internal portion of a surface of the firearm, wherein the firearm indicia comprises a predetermined pattern associated with data about the firearm.

In yet another aspect, the invention is directed to a method of identifying a firearm used to discharge at least one bullet casing, the firearm having firearm indicia formed on an internal surface of the firearm including the steps of reading a firearm indicia formed on a predetermined portion of the at least one bullet casing during the

firing of the firearm, wherein the firearm indicia is associated with information about the firearm, and associating the firearm indicia on the at least one bullet casing with information corresponding to the firearm to allow for identification of the firearm.

In another aspect, the invention is directed to a firearm marking tool including a guide having a first end and a second end and a passage extending therebetween, the guide configured to fit within a firing chamber of the firearm and having a longitudinal axis, a drive element disposed within the passage at the first end of the guide and movable within the guide along the longitudinal axis, and scribing elements slidingly disposed within the guide between the first and second ends, the scribing elements sliding orthogonal to the longitudinal axis of the guide in response to the presence of the drive element.

In another aspect, the invention provides a method of marking a firearm with firearm indicia to allow identification of the firearm from a bullet casing used in the firearm including the steps of providing a firearm marking tool to mark the firearm, the tool capable of marking an interior portion of the firearm and using the tool to mark on the predetermined portion of the firearm the firearm indicia.

A firearm barrel and firing chamber assembly comprising:

In yet another aspect, the invention is directed to firearm barrel and firing chamber assembly comprising a firearm firing chamber, a firearm barrel, and a firearm indicia formed on a predetermined internal portion of a surface of the firearm firing chamber, wherein the firearm indicia comprises a predetermined pattern associated with data about the assembly.

It is to be understood that the foregoing general description and the following detailed description are exemplary and explanatory and are intended to provide further explanation of the invention as claimed.

The accompanying drawings are included to provide a further understanding of the invention and are incorporated in and constitute a part of the specification. The drawings illustrate several embodiments of the invention and together with the description serve to explain the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a side view with a partial cutaway of a firearm in which embodiments of the firearm marking indicia according to the present invention could be used;

Fig. 2 is a partial cross sectional view of a firing chamber and barrel of firearm with firearm indicia according to one embodiment of the present invention;

Fig. 3 is an unfired bullet for use with the firearm of Fig. 2;

Fig 4 is a fired bullet casing after ejection from the firearm of Fig. 2 with firearm indicia that has been transferred onto the external perimeter surface of the bullet casing;

Fig. 5 is a partial cross sectional view of a firing chamber and barrel of firearm with firearm indicia according to a second embodiment of the present invention;

Fig. 6 is a fired bullet casing after ejection from the firearm of Fig. 5 with firearm indicia that has been transferred onto the surface of the bullet casing;

Fig. 7 is a partial cross sectional view of a firing chamber and barrel of firearm with firearm indicia according to a third embodiment of the present invention;

Fig. 8 is a cross sectional view along the line 8-8 through the predetermined portion;

Fig. 9 is a fired bullet casing after ejection from the firearm of Fig. 7 with firearm indicia that has been transferred onto the surface of the bullet casing;

Fig. 10 is a perspective view of a firearm marking tool used to mark firearm indicia on a firearm according to one embodiment of the present invention;

Fig. 11 is a cross section view of the firearm marking tool in Fig. 10 along line 11-11;

Fig. 12 is a cross section view of the firearm marking tool in Fig. 10 along line 12-12;

Fig. 13 is an enlarged view of a scribing element of the firearm marking tool in Fig. 10;

Fig. 14 is a cross section view of the firearm marking tool of Fig. 10 disposed in a portion of a firearm;

Fig. 15 is a cross section view of a firearm marking tool used to mark firearm indicia on a firearm according to another embodiment of the present invention;

Fig. 16 is a cross section view of the firearm marking tool along lines 16-16 in Fig. 15;

Fig. 17 is cross section view of the firearm marking tool of Fig. 15 disposed in a portion of a firearm according to another embodiment of the present invention;

Fig. 18 is a cross section view of a firearm marking tool used to mark firearm indicia on a firearm according to another embodiment of the present invention;

Fig. 19 is a cross section view of a firearm marking tool used to mark firearm indicia on a firearm disposed in a portion of a firearm according to another embodiment of the present invention;

Fig. 20 is a cross section view of a firearm marking tool used to mark firearm indicia on a firearm according to another embodiment of the present invention;

Fig. 21 is an end view of the firearm marking tool of Fig. 20;

Fig. 22 is a cross section view of the firearm marking tool of Fig. 20 disposed in a portion of a firearm;

Fig. 23 is a cross section view of a firearm marking tool using a electric discharge machining (EDM) process to apply the firearm indicia to the firearm; and

Fig. 24 is a cross section view of a firearm marking tool using a laser to engrave the firearm indicia on the firearm.

DETAILED DESCRIPTION OF THE INVENTION

Fig. 1 illustrates one type of firearm **10** in which the present invention can be used. As with the illustrated firearm, most of the firearms include a frame **11**, a trigger **13** to initiate the firing of the firearm **10**, a barrel **14**, and a firing chamber **12**. In most of the firearms, barrel **14** and firing chamber **12** are of unitary construction. However, the present invention is not limited to the type of weapon or the construction of the barrel and firing chamber. The firing chamber and the barrel may be separate pieces but are consider to be an assembly in the present invention. A portion of a barrel **14** and firing chamber **16** is illustrated in Fig. 2 illustrating one embodiment of the present invention. While one configuration of a firearm is

illustrated in the figures, the present invention is not so limited. The present invention also applies to any firearm that uses any type of ammunition with a form of casing, which may consist of a shell and projectile(s), such as bullets, and shells and pellets. Interior surface **16** of firing chamber **12** has firearm indicia **18** formed therein. In the embodiment illustrated in Figs. 2-4, the firearm indicia **18** includes a series of lines **20**, wherein some of lines **20** may be thicker and some may be thinner than other of the lines **20**. The combination of lines **20** and spaces therebetween of the firearm indicia **18** represent information about the firearm **10** as described in more detail below.

As is known in the art, the firing chamber **12** is circular in cross section and therefore has a circumference. In the preferred embodiment, the firearm indicia **18** extends around at least a portion of the circumference of the firing chamber **12**, as illustrated in Fig. 2. The firearm indicia **18** could be oriented 180° from that shown and extend along the firing chamber **12** in a front-to-rear or rear-to-front direction. However, the firearm indicia **18** is preferably mounted as far forward in the firing chamber **12** as possible and as close to shoulder **22** and barrel **14** as possible. The shoulder **22** acts as a stop to keep the bullet **25** (see Fig. 3) in firing chamber **12**. Close contact of the bullet **25** and the firing chamber **12** keeps the gun powder, gases, and other by-products of the firing of the firearm from coming around the bullet casing **26** and towards the operator. If the firearm indicia **18** is mounted as forward as possible in the firing chamber **12**, there is less likelihood that the firearm indicia **18** could be removed as it would be difficult to access. Additionally, the closer the

firearm indicia **18** is to the shoulder, attempts to remove the firearm indicia **18** would more likely result in damage to the shoulder **22**, allowing for "blow-back" and a reduced effectiveness of the firing of the firearm. In fact, it could even damage the firing chamber **12** and barrel **14** such that the firearm or firing chamber/barrel assembly is no longer useful. Preferably the firearm indicia **18** is located about 5 mm from the shoulder **22** and more preferably is located about 1 mm from the shoulder **22**.

When the firearm **10** is fired and the bullet **24** leaves through the barrel **14**, the firearm indicia **18** is transferred to the bullet casing **26**. The force of the explosion resulting from the firing causes the bullet casing **26** to expand and press against the interior surface **16** of firing chamber **12**. When the bullet casing **26** is malleable, the firearm indicia **18** are transferred to the bullet casing **26** from the force of the explosion during firing to form a mirror image **18'** of the firearm indicia **18**.

The firearm indicia **18** are preferably lines scribed into the interior surface **16** of the firing chamber **12** as illustrated in Fig. 2. The pattern of the lines could be a bar code or other code to identify the firearm by the information contained in the firearm indicia **18**. As illustrated in Figs. 5 and 6, the firearm indicia **28** could also be a series of alphanumerical characters. In Fig. 5, the alphanumeric characters inscribed in the firearm indicia **28** also allow for identification of the particular firearm. As with the firearm indicia **18** in Fig. 2, the firearm indicia **28** in Fig. 5 is also transferred to the bullet casing **26**. It should be noted that while the alphanumeric characters in Figs. 5 & 6 and the lines in Figs. 2 & 4 appear inverted in

firing chamber and forward on the bullet casing, it could be reversed so that the characters appear inverted in the bullet casing and not in the firing chamber.

Figs. 7-9 illustrate that the firearm indicia **30** may also be raised relative to a portion **32** where it is placed. As illustrated in Fig. 8, the firearm indicia **30** is raised relative to the surface of the portion **32** of firing chamber **12** and is generally even with the interior surface **16** of the firing chamber **12**. The indicia **30** and recessed portion **32** are both impressed onto the bullet casing **26** to form a mirror-image indicia **30'** and a raised portion **32'**. See Fig. 9.

The firearm indicia **18,28,30** corresponds to data that can uniquely identify the firearm or, in the alternative, the portion of the firearm that includes the firing chamber **12** and barrel **14**. The firearm **10** can be any type of firearm, including a hand gun, a rifle, and a shotgun. The firearm indicia **18,28,30** would preferably include unique and identifying numbers, characters, lines, dots, alphanumeric characters or other symbols that can be associated with the firearm and the firing chamber/barrel assembly. These symbols would be able to identify data that would include the serial number of the firearm, a registration number, the firearm manufacturer, the date of manufacture, the firearm model number, special edition, and the caliber of the firearm and identify the particular firearm or firing chamber/barrel assembly used. It is anticipated that a unique registration number separate and apart from the serial number on the frame could be used. If the registration number is different from the serial number on the frame, it could be linked in a database to the serial number or other identifying information. Also, if the firing chamber/barrel is a

replacement part, it may also have a separate registration number that could be associated with a specific serial number or person purchasing the replacement.

Figs. 9 & 10 illustrate one embodiment of a firearm marking tool **40** that can be used to scribe the firearm indicia **18,28,30** into the firearm **10**. The firearm marking tool **40** includes a guide **42** having a first end **44,** a second end **46**, a passage **47** therebetween, and a drive element **48**. The firearm marking tool **40** may also have an extension **50** that assists in locating the tool **40** in a firearm **10**. See, e.g., Fig. 14. Drive element **48** includes a shaft **52** with a conical section **54** at the first end **56** and a drive head **58** at the second end **60**. The first end **56** of the drive element **48** is inserted into the first end **44** of the guide **42** and slidingly moves along and within the passage **47**. A resilient element **62** is disposed around drive element **48** and between the first end **44** of the guide **42** and the drive head **58**. The drive head **58** and the first end **44** are configured to allow the resilient member **62** to engage each other to bias the drive element **48** away from the guide (or to the left in the figures). While a spring is illustrated in the figures, any resilient member could be used. For example, elastomeric material in the shape of a sleeve around drive element **48** can be used.

The firearm marking tool **40** also has scribing elements **64** to mark the firearm indicia **18,28,30** on the interior surface **16** of the firing chamber **12**. The scribing elements **64** are located in individual channels **66** in the guide **42**. As shown in Fig. 12, there are eight scribing elements **64** and channels **66**. However, any number of scribing elements **64** and channels **66** could be used with the guide **42**. Additionally, while the scribing elements **64** are located evenly around the circumference of the

guide **42**, they could have different spacing or be left empty (no scribing elements **64** inserted into the channels **66**) to scribe the correct pattern on the firearm **10**.

The scribing elements **64** preferably have a shaft **68**, a drive element engagement surface **70** and a firearm engagement surface **72**. When the drive element **48** is moved in the direction of the arrow F1 in Fig. 11, the conical section **54** is moved forward to engage the drive element engagement surfaces **70** of shafts **68**. See Fig. 13. The scribing elements **64** move radially outward (in the direction of arrows **F2**) to engage the firing chamber surface **16** and form the firearm indicia **18**. When the drive element **48** is returned to the biased position to the left, the scribing elements **64** are no longer forced into the firing chamber **12** and no further marks are made. Each of the firearm engagement surfaces **72** would typically have at least one alphanumeric character to imprint into the firing chamber **12**. See, e.g., Fig. 5. The firearm engagement surfaces **72** may also have dots, dashes or other symbols that are used to make the indicia **18,28,30**.

An alternative embodiment of the firearm marking tool is illustrated in Figs. 15-17, which is similar to the prior embodiment except that the firearm marking tool **40'** has a retainer element **74** that is attached to each of the scribing elements **64'** to provide an inward force to pull each of the scribing elements **64'** toward the passage **47** in the tool **40'**. While a single spring ring **74** is illustrated in the figures, one retainer member **74** for each of the scribing elements **64'** could also be used. The scribing elements **64'** each have a groove **76** to engage the retainer element **74** .

Another embodiment of the firearm marking tool **80** is illustrated in Fig. 18. The tool **80** is similar to the other two embodiments above, but the guide **82** has a reduced area **84** that is configured to engage the conical section **54** of the drive element **52**. This configuration at the second end **86** of the guide **82** prevents the drive element **52** from advancing too far and pushing the scribing elements **64** too far out and into the wall of the firing chamber. While the retainer element **74** is not shown in Fig. 17, it could be used with the scribing elements **64** as well, provided the grooves are also present.

Another embodiment of the firearm marking tool **90** is illustrated in Fig. 19. The drive element of the previous embodiments has been replaced in the tool **90** with a drive element **92** that is connected to a reciprocating member of a pneumatic controller or a hydraulic controller. The first end **94** of the drive element **92** in this embodiment also has a conical shape as in the other embodiments. The drive element **92** is connected to the controller through a coupling **96**. The coupling **96** is attached to the drive element **92** by a coupling pin **98** inserted into a coupling bore **100** and engages a hole **102** in the drive element **92**. The coupling **98** moves in the directions of the arrows **A** to cause the scribing elements **64** to move as in the previous embodiments.

The first end **104** of the guide **106** is different from that of the previous embodiments. The first end **104** of the guide **106** is more elongated than the previous embodiments to allow the scribing elements **64** to be moved forward in the guide **106** to allow for marking of the firing chamber **12** closer to the shoulder **22**.

Another embodiment of the firearm marking tool is illustrated in Fig. 20. The firearm marking tool **110** is connected by a coupling **112** to a hydraulic or pneumatic controller as in the previous embodiment. The coupling **112** is attached to the drive element **114** by a coupling pin **116** inserted into a coupling bore **118** and engages a hole **120** in the drive element **114**. However, rather than the drive element of the previous embodiments, drive element **114** of this embodiment is larger in diameter and replaces the drive element and guide of those embodiments. The drive element **114** is slightly smaller in diameter than the firing chamber **12**. At the end of the drive element **114** is an attachment assembly **122** with a screw **124** that allows for interchangeable scribing segments **126**. The screw **124** threadingly engages the first end **128** of the drive element **114**, although other attachment methods are also possible, such as quarter turns, a cross pin similar to the couple pin **116**, bayonet slots, press fit, and adhesives. The scribing segments **126** either have a scribing element **130** or a flat element **132**. The scribing elements **130** can have a number of widths to scribe a variety of lines in the firing chamber **12**. The arrangement of the scribing elements **130** and flat elements **132** can be used and changed as needed to compose the firearm indicia for each firearm. The firearm marking tool **110** can also be moved along the length of the firing chamber to create the lines **20** as illustrated in Fig. 2.

Fig. 23 illustrates the use of a wire or electrode **140** used with an electric discharge machining (EDM) process. A precision wire EDM machine removes metals from metal blocks, such as the firing chamber of a firearm, by creating thousands of electrical discharges per second that flow between a wire and the metal blocks,

vaporizing metal in the controlled area. The motion of the wire may be controlled by any commercially available computer numerical control (CNC) software. The firearm indicia **18** can be programmed into the computer (not shown) and the EDM will create the firearm indicia **18**. It should be noted that although the line form of the indicia is illustrated in Fig. 23, the character form or any other form could also be formed using the EDM process.

Fig. 24 illustrates the use of a laser beam **150** from a laser beam generator **152**, where the laser beam light energy is used to remove material from the firing chamber wall **12** in a pattern that result in firearm indicia **18**. The laser beam generator is a machine that can be precisely controlled by a CNC machine and software.

It will be apparent to those skilled in the art that various modifications and variations can be made in the firearm marking indicia and tools of the present invention without departing from the spirit or scope of the invention. Thus, it is intended that the present invention cover the modifications and variations of this invention provided they come within the scope of the appended claims and their equivalents.